REMARKS

Applicants have amended their claims in order to facilitate proceedings in connection with the above-identified application, further clarifying the definition of various aspects of the present invention. Specifically, Applicants have amended each of claims 1 and 16 to recite that the insulating resin composition layer contains polyamidoimide resin and epoxy resin; and to recite that the surface treatment includes, inter alia, an anti-corrosive treatment "using any one of nickel, tin, zinc, molybdenum, and cobalt or an alloy thereof". As to present amendments of claims 1 and 16, note, for example, pages 13 and 14, as well as the sole full paragraph on page 22, of Applicants' specification. Moreover, to facilitate and simplify proceedings, Applicants have cancelled claims 6, 7, 11, 21, 22, 26 and 56-63 without prejudice or disclaimer.

Moreover, Applicants are adding new claims 64-66 to the application. Claim 64, dependent on claim 16, recites that the polyamidoimide resin is siloxane denatured polyamidoimide resin; and claims 65 and 66, dependent respectively on claims 55 and 64, recite that the siloxane denatured polyamidoimide resin has a molecular weight not lower than 50,000. In connection with newly added claims 64-66, note, for example, the sole full paragraph on page 17 of Applicants' specification.

The requirement by the Examiner in the third paragraph of Item 1 on page 2 of the Office Action mailed January 7, 2008, for Applicants to point out where in the specification that previously amended and new claims are supported, the Examiner pointing to amendments to previously considered claims 1, 16, 55, 56 and 58, is noted. However, in the Submission Under 37 CFR 1.114 (Amendment) filed October 25, 2007, Applicants pointed out support in their original specification for

claims as amended therein. Note, in particular, pages 12 and 13 of the Submission filed October 25, 2007. In any event, and in order to clearly comply with the requirement by the Examiner in the third paragraph of Item 1, on page 2 of the Office Action mailed January 7, 2008, in connection with amendments to claims 1 and 16 in the Submission filed October 25, 2007, note the sole full paragraph on page 17 of Applicants' specification. As Applicants are cancelling claims 56 and 58 without prejudice or disclaimer, it is respectfully submitted that any requirement with respect to showing description in Applicants' original disclosure in connection therewith is moot. In any event, with respect to claims 55, 56 and 58, and as set forth in the paragraph bridging pages 12 and 13 of Applicants' Submission filed October 25, 2007, note, for example, pages 28-34 of Applicants' specification. See also, for example, the sole full paragraph on page 17 of Applicants' specification, disclosing use of a siloxane denatured polyamidoimide resin.

Reference to the Terminal Disclaimer filed October 25, 2007, on page 2 of the Office Action mailed January 7, 2008, is noted. Enclosed herewith is a further Terminal Disclaimer, correcting the Application Number to be Application No. 11/044,533. In view of the enclosed Terminal Disclaimer, it is respectfully submitted that Applicants have made the requested correction to the Terminal Disclaimer.

Applicants respectfully traverse the rejection of their claims under the second paragraph of 35 USC 112, as being indefinite, set forth in Item 2 on pages 2-4 of the Office Action mailed January 7, 2008, especially insofar as this rejection is applicable to the claims as presently amended. Thus, claims 58 and 60 have been cancelled without prejudice or disclaimer; and, accordingly bases for rejection of these claims,

and claims dependent thereon, as being indefinite, are moot.

Applicants have amended claims 1 and 16 to recite that the insulating resin layer contains polyamidoimide resin and epoxy resin, deleting recitation of "as principal ingredient". In view of this amendment of claims 1 and 16, it is respectfully submitted that the basis for rejection of claims 1 and 16 under the second paragraph of 35 USC 112, set forth in the first paragraph on page 3 of the Office Action mailed January 7, 2008, is moot. Thus, clearly claim 1 requires that the insulating resin composition layer includes both polyamidoimide resin and epoxy resin, without recitation of any one ingredient being "a principal ingredient", and thus the question raised by the Examiner in lines 5-8 on page 3 of the Office Action mailed January 7, 2008, is moot.

The requirement by the Examiner for Applicants to show support from the original specification "from which the newly claimed portions were derived", in the last sentence of the first paragraph on page 3 of the Office Action mailed January 7, 2008, is noted. In connection therewith, note particularly the sole full paragraph on page 17 of Applicants' specification, as well as the paragraph bridging pages 13 and 14 of Applicants' specification, particularly in connection with the claims as presently amended. Thus, it is respectfully submitted that Applicants' original disclosure clearly supports the presently claimed subject matter, including wherein the insulating resin composition layer contains polyamidoimide resin and epoxy resin.

The additional contention by the Examiner that, in claims 1 and 16, it is vague and indefinite as to whether "a chromate treatment" is equivalent to "an anti-corrosive treatment", is noted. As presently amended, claims 1 and 16 recite an

anti-corrosive treatment using any one of specified metals or alloys thereof, such materials or alloy thereof not specifically reciting chromium. It is respectfully submitted that the anti-corrosive treatment which is the surface treatment recited in claim 1 is different from a chromate treatment as in claim 1. The question by the Examiner as to whether "a chromate treatment" is equivalent to "an anti-corrosive treatment", set forth in the second full paragraph on page 3 of the Office Action mailed January 7, 2008, is noted. It is respectfully submitted that such question is of no relevance, since the anti-corrosive treatment as presently recited in claims 1 and 16 is different from the chromate treatment as also presently recited in claims 1 and 16, noting particularly the metals/alloy used in the anti-corrosive treatment.

Contentions by the Examiner in the last two (2) paragraphs on page 3, and in the first paragraph on page 4, of the Office Action mailed January 7, 2008, with respect to claims 56, 58 and 60, and claims dependent thereon, are moot, in light of cancelling of these claims without prejudice or disclaimer.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the references applied by the Examiner in rejecting claims in the Office Action mailed January 7, 2008, that is, the teachings of U.S. Patent No. 6,132,589 to Ameen, et al., and European Patent Application No. 1,006,763 to Fujiwara, et al., under the provisions of 35 USC 103.

Specifically, it is respectfully submitted that the teachings of the applied references do not disclose, nor would have suggested, such resin coated metal foil, or such metal clad laminate, or such printed wiring board, as in the present claims, including, inter alia, wherein the insulating resin composition layer contains a

polyamidoimide resin and an epoxy resin, with a metal foil fixed to a single surface or both surfaces of the insulating resin composition layer, and wherein a thickness of the metal foil is not more than 3 μm. Note claims 1 and 16, and claims 31 and 41.

Furthermore, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such resin coated metal foil or such metal clad laminate or such printed wiring board as in the present claims, having features as discussed previously in connection with claims 1 and 16, and, moreover, the surface roughness of the metal foil as in claims 2, 17, 51 and 52, or the interfacial roughness between the insulating resin composition layer and the metal foil as in claims 4 and 19; and/or wherein the silane coupling agent chemically reacts with the insulating resin composition by heating (note claims 10 and 25); and/or wherein the insulating resin composition contains epoxy resin which is liquid at room temperature (see claims 13 and 28); and/or relative dielectric constant or dielectric loss tangent of the post-cure insulating resin composition as in claims 15 and 30; and/or the printed wiring board having a peel strength as in claims 33, 34, 43 and 44; and/or wherein the polyamidoimide resin is siloxane denatured polyamidoimide resin as in claims 55 and 64, especially wherein the siloxane denatured polyamidoimide resin has a molecular weight not lower than 50,000 (see claims 65 and 66).

The present invention as claimed in the above-identified application relates to a resin coated metal foil and metal clad laminate, particularly suitable for printed wiring boards, and the printed wiring boards produced therefrom.

Recently, as demand for miniaturization, weight reduction and speeding-up of electronic equipment has increased, density growth of the printed wiring board has

been investigated, particularly using a semi-additive process, the semi-additive process allowing finer wiring to be formed. However, various problems arise in connection with circuit formation on a resin coated metal foil by the semi-additive process, including adherence of the metal foil to the resin. While it has previously been proposed to provide a roughened layer having a thickness of several micrometers for obtaining a given peel strength between the metal foil and a resin cured material, this obstructs thinning of the metal foil. Moreover, due to the irregularity of the roughened surface, there can disadvantageously be generated an etching residue, which causes a short-circuit failure, and electric resistance of a conductor circuit of the roughened layer increases so that transmission loss becomes larger.

While it has been proposed to utilize a copper foil in which the roughening treatment is not performed, using a peroxide curing resin composition, under this approach it becomes necessary to use a peroxide curing resin as the insulating layer, but there is a fear that reliability of the printed wiring board manufactured with the copper clad laminate including the peroxide curing resin decreases. Moreover, as the peroxide curing resin itself is a potentially hazardous material, and has a greater cost than previously proposed insulating resins, use of the peroxide curing resin is not practical.

Against this background, Applicants provide a metal clad laminate and resin coated metal foil, and printed wiring board formed therefrom, having good adhesion and which can be provided (manufactured) and used at relatively low cost and which can be easily handled. Applicants have found that by utilizing an insulating resin composition layer containing a polyamidoimide resin and an epoxy resin, as in the

present claims, together with the metal foil which has been subjected to an anti-corrosive surface treatment, a chromate treatment and a silane coupling treatment, and wherein the thickness of the metal foil is not more than 3 μm, with substantially no roughening treatment having been performed on surfaces of the metal foil objectives according to the present invention are achieved. In particular, by providing a laminate/metal clad foil wherein the foil has a thickness of not more than 3 μm, treated as mentioned previously, with the insulating resin composition layer containing a polyamidoimide resin and an epoxy resin as discussed previously, the structure is excellent not only in adhesion of insulating resin layer and metal (e.g., copper) foil, but also in good wiring formability. In particular, as described in the sole full paragraph on page 2 of Applicants' specification, by providing the metal foil of thickness of not more than 3 μm, good wiring formability is achieved.

As described on page 17 of Applicants' specification, among the thermoplastic resins, the polyamidoimide resin is useful because it has good adhesion to the metal in addition to excellent heat resistance and humidity resistance. Moreover, in order to improve drying properties, it is also possible to use siloxane denaturization. See especially claims 55 and 64.

It is emphasized that according to the present invention, wherein the insulating resin composition layer contains, inter alia, polyamidoimide resin, unexpectedly better results are achieved in connection with good adhesion to the metal in addition to excellent heat and humidity resistance; and, moreover, using siloxane denaturation, drying properties are improved. Note the sole full paragraph on page 17 of Applicants' specification.

Unexpectedly better results, according to the presently claimed invention, are

also seen in the Examples and Comparative Examples in Applicants' original disclosure. Such Examples and Comparative Examples must be considered in determining patentability of the presently claimed subject matter. See In re DeBlauwe, 222 USPQ 191 (CAFC 1984).

That is, as seen from Tables 2 and 3 respectively on pages 55 and 56 of Applicants' original disclosure, relative dielectric constant and dielectric loss tangent of resin composition 3, used in, e.g., Examples 5-8 and 20-22, are low, and superior to that of resin composition 1 used in, e.g., Examples 1, 2, 9, 10, 16, 17, 24 and 25. A low relative dielectric constant and dielectric loss tangent are preferable to applications in which a low-loss electric signal is required, as seen on page 57, lines 14-17 of Applicants' specification. In this regard, note that resin composition 3 contains epoxy resin and siloxane denatured polyamidoimide resin, while resin composition 1 contains only epoxy resin.

In addition, attention is respectfully directed to Examples 5, 6, 7 and 8 shown in the aforementioned Tables, wherein each Example retains excellent peel strength of the resin composition independent of coupling agent and of metal used in an anti-corrosive treatment, even after heating test and PCT test (Pressure Cooker Test). Compare with the peel strength of resin composition 1, which depends on the type of coupling agent. For example, the peel strength of Examples 9 and 10, using an epoxy-type coupling agent, is less than that of Examples 1 and 2, using an amine-type coupling agent. Thus, in Examples 9 and 10 an initial peel strength is not retained after heating and PCT tests. Moreover, the peel strength of resin composition 2 using a polyphenylene resin as a thermoplastic resin, depends on the type of metal used in the anti-corrosive treatment. For example, the peel strength of

Examples 11 and 12, using zinc in the anti-corrosive treatment, is less than that of Examples 3 and 4, using nickel; and in Examples 11 and 12, an initial peel strength cannot be maintained after heating and PCT tests.

As can be seen in the foregoing, and particularly from the Examples and Comparative Examples in Tables 2 and 3, unexpectedly better results are achieved by the present invention, utilizing, inter alia, a polyamidoimide resin in the insulating resin composition layer, particularly wherein the insulating resin composition layer contains polyamidoimide resin and epoxy resin, and especially where the polyamidoimide resin is a siloxane denatured polyamidoimide resin. Accordingly, even assuming, arguendo, that the teachings of the applied references would have established a prima facie case of obviousness, such prima facie case of obviousness is overcome by the evidence of record in the above-identified application.

As will be shown in the following, it is respectfully submitted that the teachings of the applied references, Fujiwara, et al. and Ameen, et al., would have neither disclosed nor would have suggested the presently claimed invention (that is, would not have established a prima facie case of obviousness); however, as shown in the foregoing, even assuming, arguendo, that the teachings of the applied references would have established a prima facie case of obviousness, the evidence of record rebuts such prima facie case, establishing unobviousness of the presently claimed subject matter.

Ameen, et al. discloses a treated copper foil, having a layer of zinc oxide adhered to a base surface of at least one side of the copper foil, the layer of zinc oxide having a thickness of about 3Å to about 80Å, and a layer of a trivalent chromium oxide adhered to the layer of zinc oxide. This patent further discloses, in

one embodiment, that the foil has a layer of a silane coupling agent adhered to the layer of trivalent chromium oxide. See column 2, lines 15-22. Note also column 2, lines 52-63; column 3, lines 1-6; column 4, lines 55-62; column 5, lines 19 and 20; and column 6, lines 47-50.

Fujiwara, et al. discloses a copper foil for making printed circuit boards, the copper foil comprising a copper layer, an alloy layer (A) comprising copper, zinc, tin and nickel which is formed on a surface of the copper foil, and a chromate layer which is formed on a surface of the alloy layer, the surface to be laminated with a substrate for a printed wiring board. This patent document discloses that the copper foil may further have a silane coupling agent layer on a surface of the chromate layer. Note especially paragraphs [0016] – [0018] on page 3 of this patent document. Note also paragraphs [0026] – [0035] on page 4; and paragraphs [0043]–[0046] on page 5.

As seen in the foregoing, as well as from a full review of each of Ameen, et al. and of Fujiwara, et al., neither of these references would have disclosed nor would have suggested structure as in the present claims, including use of the polyamidoimide resin together with epoxy resin in the insulating resin composition layer, especially together with thickness of the metal foil or other features of the present invention as discussed previously.

In the first paragraph on page 6 of the Office Action mailed January 7, 2008, the Examiner acknowledges that neither Ameen, et al. or Fujiwara, et al. discloses containing polyamidoimide resin in the insulating resin composition layer, but in the second paragraph on page 6 contends that in view of the prior art teachings one skilled in the art "would choose a desired resin material or resin mixture because

such discovery involves only routine experimentations". Such contention by the Examiner is respectfully traversed. It is respectfully submitted that Fujiwara, et al. only discloses "an epoxy resin or the like" (note paragraphs [0076] and [0077] on page 7 of this patent document), while Ameen, et al. in column 6, lines 47-59, discloses epoxy resins, while disclosing various other useful resins including amino type resins produced from a specified reaction, polyesters, phenolics, silicones, polyamides, polyimides, di-allyl phthalates, phenylsilanes, polybenzimidazoles, diphenyloxides, polytetrafluoroethylenes, cyanate esters and like. Neither document discloses polyamidoimides, or suggests such material. Taking the teachings of Fujiwara, et al. and of Ameen, et al. as a whole, as required under the requirements of 35 USC 103, it is respectfully submitted that such teachings would not directed one of ordinary skill in the art to including polyamidoimides as recited in the present claims, much less both polyamidoimides and epoxy resins, and advantages achieved thereby.

The additional contention by the Examiner in the second full paragraph on page 6 of the Office Action mailed January 7, 2008, that choice of a desired resin material or resin mixture would have been obvious unless Applicants "can show some specific reasons why polyamidoimide resin is an essential component and by adding such to the resin composition would greatly improve or give an unexpected/extraordinary performance to the product", is noted. It is respectfully submitted that this is not a proper test for overcoming a prima facie case of obviousness, so as to establish unobviousness. Rather, the proper test is whether the presently claimed material provides unexpectedly better results over at least the closest prior art. Moreover, it is respectfully submitted that, as shown previously, the

evidence in Applicants' specification shows such unexpectedly better results for the presently claimed subject matter, including the polyamidoimide resin, especially the siloxane denatured polyamidoimide resin as in, e.g., claims 55 and 64.

The additional contention by the Examiner in the third full paragraph on page 6 of the Office Action mailed January 7, 2008, that it would have been obvious to choose a surface roughness and thickness for the copper foil "because these variables can easily be obtained by rolling process", is noted. However, it is respectfully submitted that the test under 35 USC 103 is not whether the variables can easily be obtained. Rather, it is respectfully submitted that the test under 35 USC 103 is whether the prior art discloses, or would have suggested, such features (i.e., under the present circumstances, the surface roughness and thickness for the copper foil as recited in the present claims). Using the proper test under 35 USC 103, it is respectfully submitted that neither of Ameen, et al. or Fujiwara, et al., would have disclosed or would have suggested the presently claimed subject matter, including surface roughness and thickness of the copper foil, and advantages thereof.

Furthermore, note that in Example 1 in columns 11 and 12 of Ameen, et al., this patent document discloses a copper foil sample having a weight of 1 oz/ft^2, which is probably about 40 μm thickness, further teaching away from the presently claimed subject matter. Fujiwara, et al. mentions use of copper foil of a thickness of 35 μm in Example 1 on page 8, also teaching away from the relatively small thickness metal foil of the present claims. Particularly in view of the advantages achieved through use of the relatively small thickness metal foil as in the present claims, it is respectfully submitted that the presently claimed subject matter

patentably distinguishes over the teachings of the applied references.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently pending in the above-identified application, are respectfully requested.

To the extent necessary, Applicants hereby petition for an extension of time under 37 CFR 1.136. Kindly charge any shortage of fees due in connection with the filing of this paper, including any extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Account No. 01-2135 (case 1204.44255X00), and please credit any overpayments to such Deposit Account.

Respectfully submitted,

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